



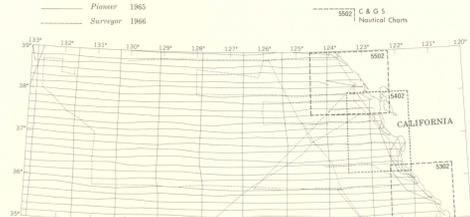
INDEX MAP SHOWING AREA COVERED BY THE
TRANSCONTINENTAL GEOPHYSICAL SURVEY.
AREA OF THIS MAP SHADDED

EXPLANATION

- 100 --- Gravity contours
Interval, 20 millibars;
dashed where incomplete
- Trackline path
- Bathymetric contours
Interval 200 meters
- Bathymetric contour
showing area of lower depth



Modified base assembled from U.S. Coast and Geodetic Survey
World Aeronautical Charts, scale 1:1,000,000
Lambert conformal conic projection



INDEX MAP SHOWING SOURCES OF BATHYMETRIC INFORMATION

INTRODUCTION
As part of the Environmental Science Services Administration U.S. Coast and Geodetic Survey contribution to the Upper Mantle Project, systematic soundings and sea-surface gravity measurements were made by the USC&GS *Pioneer* (July-October 1965) and the USC&GS *Surveger* (April-May 1966) in the area of the west coast extension of the United States Transcontinental Geophysical Survey.

CONTROL
Primary position control was the U.S. Navy Satellite Navigation System, fixes being taken at 10-regular intervals averaging once every two hours. The positions so obtained were supplemented with Loran-A readings, astronomic fixes, and radar and visual land fixes. Accuracy of the smooth-plotted ship's position, estimated in terms of discrepancies in soundings at trackline crossings, is ± 1.5 km.

BATHYMETRY
Pioneer was equipped with the conventional EDO-185 (AN/UQN-1) transducers and Mk 11a Precision Depth Recorder. *Surveger* employed an electronically-stabilized, narrow beam transmitter/receiver array, and Mk 11a Precision Depth Recorder; a Raytheon DE-721 fathometer was used in water shallower than 400 m. Distribution of the sounding tracks is shown on the accompanying index map. Supplementary data for the inshore area was taken from published Coast and Geodetic Survey charts, as indicated. In the area of the "meander" in the Monterey fan-valley (38°15'N, 122°45'W) the interpretation of Shearcliff (1965) was adopted.

GRAVITY
Sea-surface gravity measurements were made with LaCoste and Romberg Air-Sea Gravity Meter no. S-11 aboard *Pioneer* on 3-12 aboard *Surveger*. Both instruments are gimbal-suspended, equipped with horizontal accelerometers damped to approximately 0.5 of critical period, and fitted with the servo-driven "nuller" of automatic readout. Automatic readout circuit delay of approximately three minutes was used throughout the study.

Observations at five-minute time intervals were corrected for time delay, Earth's effect, and instrumental drift, and reduced to simple Bouguer anomalies on an IBM 1620 computer. For the Bouguer anomaly computation, crustal density of 2.84 g/cc was assumed; the 1958 International formula for theoretical gravity was used.

Data corresponding to intervals of instrument malfunction, excessive ship's motion, and poor geographic control were rejected. Trackline segments showing systematic discrepancies of more than 10 mgal were re-processed to obtain the desired consistency, or rejected. The accepted data were analyzed for internal consistency in terms of trackline crossings: interpolated values at 138 *Pioneer* or *Surveger* line crossings yielded a mean discrepancy of 7.7 mgal (without regard to sign); the mean discrepancy was 11.2 mgal. The mean discrepancy for all crossings (520) was 9.0 mgal. The estimated probable error in any single gravity value is less than ± 15 mgal.

Track segments from which data were used in preparing the Bouguer anomaly contour map are indicated by tic marks on the contours where they cross the track lines. In the area between the Farallon Islands and Drakes Bay, sea-surface data were supplemented by understar observations reported by Orin and others (1962).

GRAVITY DATA SOURCES
Pioneer observations are based on: PIONEER 65, Oakland, California; and understar observations reported by Orin and others (1962). *Surveger* observations are based on: SURVEGER 66, San Francisco, California; Bay Area Survey and Science Service, at San Francisco; and U.S. Coast and Geodetic Survey, at San Francisco. The accuracy of the sea surface gravity observations is estimated to be ± 10 mgal.

Connections between the adopted base station and ship's berth were made with portable Worden gravity meters.

ACKNOWLEDGEMENTS
The geophysical measurements were made and smooth-plotted ship's track prepared by officers and crew members of the *Pioneer* and *Surveger*. M. J. Yellin (U.S. Coast and Geodetic Survey) developed the computer processing program and, together with R. V. Mase (formerly, Institute for Oceanography), assisted materially in processing and evaluating the gravity data. D. F. Merrill, L. A. Weeks, and P. F. Saegh (Atlantic Oceanographic Laboratories) assisted at many stages of contouring the bathymetric data. The final compilation was prepared by the U.S. Coast and Geodetic Survey.

Shepard, F. P. 1960. Meander in valley creating a deep-sea fan. *Science*, Vol. 64, pp. 280-281.

Orin, Robert, Fanning, E. P., Jones, R. B., and Garwood, R. S., 1962. *Sea-surface gravity measurements in the Pacific region*. San Francisco, California: Washington, D.C.: U.S. Coast and Geodetic Survey.

TRANSCONTINENTAL GEOPHYSICAL SURVEY (35°-39° N)
GRAVITY AND BATHYMETRIC MAP FROM THE COAST OF CALIFORNIA TO 133° W LONGITUDE

By
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A CONTRIBUTION TO THE UPPER MANTLE PROJECT

